GTM_ATOM_PWM_1 for KIT_AURIX_TC334_LK

GTM ATOM PWM generation

AURIX™ TC3xx Microcontroller Training
V1.0.0

Scope of work

GTM ATOM is used to generate a PWM signal, which is driving the intensity of an LED.

The LED is driven by pin 5 of the port 00. The state of the pin is controlled by the PWM signal generated by the ATOM timer of GTM.

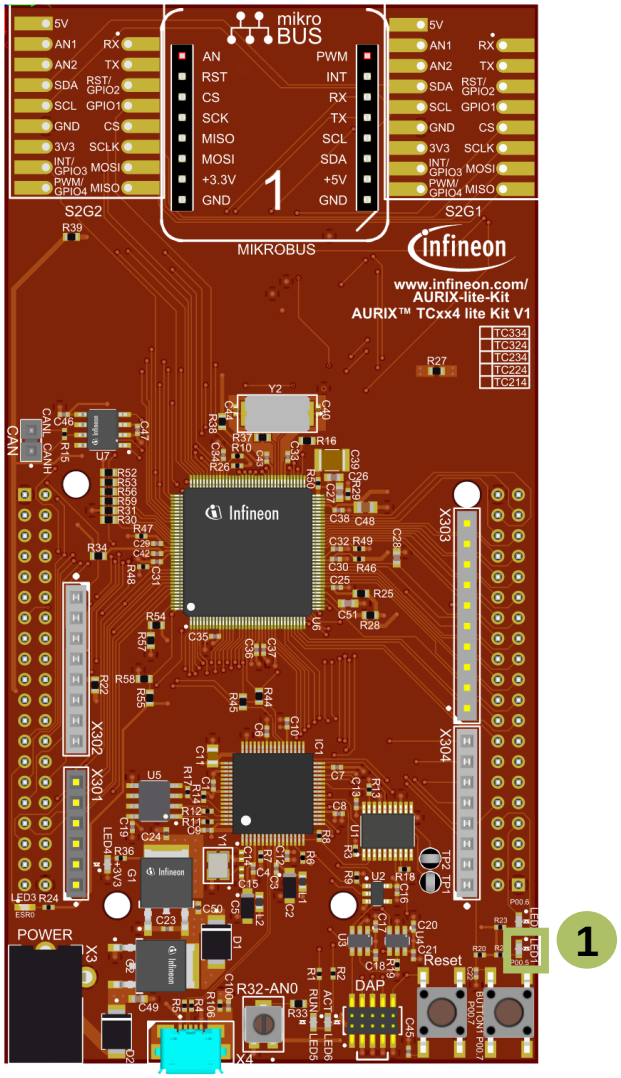
Introduction

- The Generic Timer Module (GTM) is a modular timer unit designed to accommodate many timer applications
- It has an in-built Advanced Router Unit (ARU) that can be used to exchange specific data between sub-modules without CPU interaction
- The ARU-connected Timer Output Module (ATOM), which is part of the GTM, is able to generate complex output signals
- The Clock Management Unit (CMU) is responsible for clock generation of the GTM. The Configurable Clock Generation Subunit (CFGU) provides eight clock sources for the GTM submodules: TIM, TBU, MON and ATOM

Hardware setup

This code example has been developed for the board KIT_A2G_TC334_LITE.

LED1 (1) is used for this example.



Implementation

Configuring the ATOM

The configuration of the ATOM is done once in the setup phase by calling the initialization function ***initGtmAtomPwm()*** containing the following steps:

- Enable the GTM by calling the function ***IfxGtm_enable()***
- Set the CMU clock 0 frequency to 1 MHz with the function ***IfxGtm_Cmu_SetClkFrequency()***
- Enable the CMU clock 0 by calling the function ***IfxGtm_Cmu_enableClocks()***

The function ***IfxGtm_Atom_Pwm_initConfig()*** initializes an instance of the structure ***IfxGtm_Atom_Pwm_Config*** with its default values.

Implementation

Configuring the ATOM

- The ***IfxGtm_Atom_Pwm_Config*** structure allows to set the following parameters to initialize the module:
  - ***atom*** – Selection of the ATOM which is counting (ATOM 0 in this example)
  - ***atomChannel*** – Selection of the channel which is driving the LED (Channel 4 in this example)
  - ***period*** – Setting of the period for the PWM signal to the desired value
  - ***pin.outputPin*** – Selection the LED as output pin
  - ***synchronousUpdateEnable*** – Enabling of Synchronous Update of the timer

- After configuration, the function ***IfxGtm_Atom_Pwm_init()*** initializes and activates the ATOM with the user configuration

- Start the PWM with the function ***IfxGtm_Atom_Pwm_start()***

All the functions used for the configuration of the ATOM are provided by the iLLD header ***IfxGtm_Atom_Pwm.h***.

Implementation

Setting the duty cycle

The setting of the duty cycle is done by calling the function ***setDutyCycle()***, which contains the following steps:

- Set the ***dutyCycle*** parameters of the instance of the configuration structure to set the duty cycle for the PWM signal to the desired value
- Call the function ***IfxGtm_Atom_Pwm_init()*** to re-initialize and re-activate the ATOM with the new configuration

The functions ***IfxGtm_Atom_Pwm_init()*** is provided by the iLLD header ***IfxGtm_Atom_Pwm.h***.

Fading the LED

The fading of the LED is done in the function ***fadeLED()*** by repetitively adding or removing a step value to the duty cycle of the PWM.

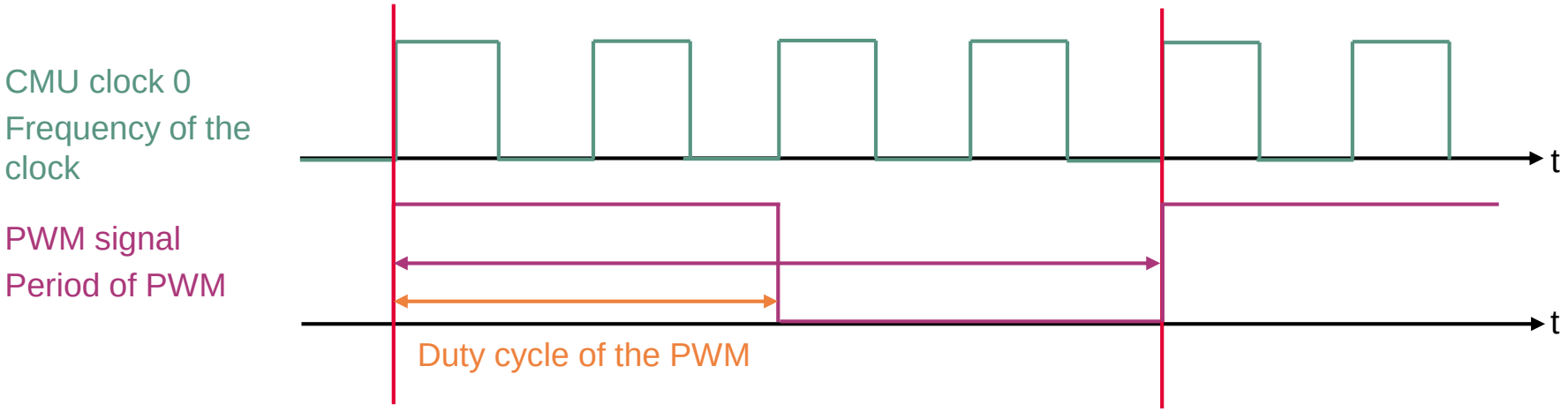
Implementation

Calculation example

The CMU clock 0 frequency (f_{clk0}) is set to 1 MHz in this example. The period value to have the desired PWM frequency (f_{PWM}) is calculated with the following formula:

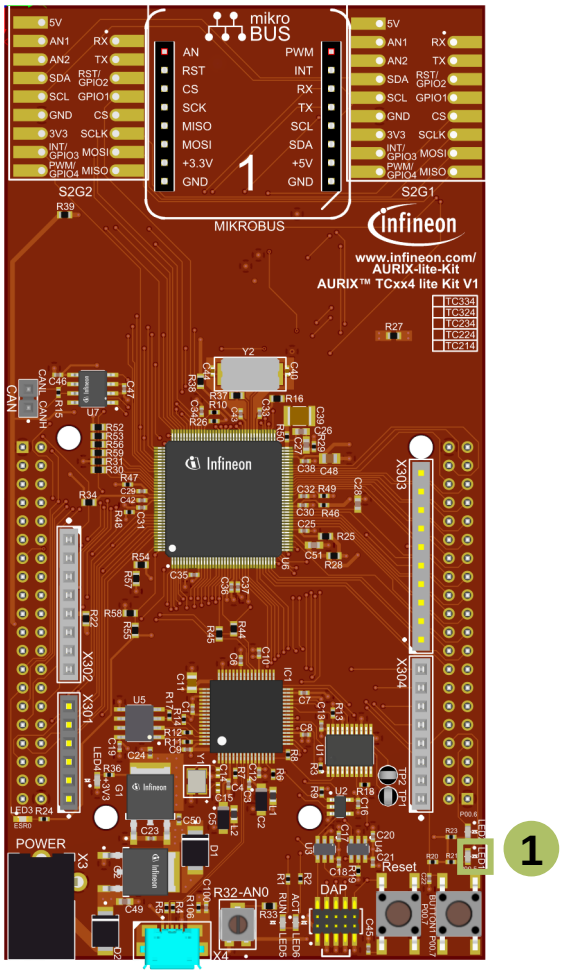
$$Period = \frac{f_{clk0}}{f_{PWM}}$$

In this example: $Period = \frac{1\ MHz}{200\ Hz} = 5\ 000$ ticks



Run and Test

After code compilation and flashing the device, observe the **LED1** (1), which should be fading.



References

- AURIX™ Development Studio is available online:
- https://www.infineon.com/aurixdevelopmentstudio
- Use the *„Import...“* function to get access to more code examples.

- More code examples can be found on the GIT repository:
- https://github.com/Infineon/AURIX_code_examples

- For additional trainings, visit our webpage:
- https://www.infineon.com/aurix-expert-training

- For questions and support, use the AURIX™ Forum:
- https://www.infineonforums.com/forums/13-Aurix-Forum

Trademarks
All referenced product or service names and trademarks are the property of their respective owners.

Edition 2021-12
Published by
Infineon Technologies AG
81726 Munich, Germany

Do you have a question about this document?
Email: erratum@infineon.com

Document reference
GTM_ATOM_PWM_1_KIT_TC334_LK

IMPORTANT NOTICE
The information given in this document shall in no event be regarded as a guarantee of conditions or characteristics ("Beschaffenheitsgarantie") .

With respect to any examples, hints or any typical values stated herein and/or any information regarding the application of the product, Infineon Technologies hereby disclaims any and all warranties and liabilities of any kind, including without limitation warranties of non-infringement of intellectual property rights of any third party.

In addition, any information given in this document is subject to customer's compliance with its obligations stated in this document and any applicable legal requirements, norms and standards concerning customer's products and any use of the product of Infineon Technologies in customer's applications.

The data contained in this document is exclusively intended for technically trained staff. It is the responsibility of customer's technical departments to evaluate the suitability of the product for the intended application and the completeness of the product information given in this document with respect to such application.

For further information on the product, technology, delivery terms and conditions and prices please contact your nearest Infineon Technologies office (www.infineon.com).

WARNINGS
Due to technical requirements products may contain dangerous substances. For information on the types in question please contact your nearest Infineon Technologies office.

Except as otherwise explicitly approved by Infineon Technologies in a written document signed by authorized representatives of Infineon Technologies, Infineon Technologies' products may not be used in any applications where a failure of the product or any consequences of the use thereof can reasonably be expected to result in personal injury.